

ESH Coordinators Meeting

# **Chemical Storage and Safety Inspection Preliminary Report**

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## Chemical Storage and Safety Inspection Preliminary Report

**BNL is not a time bomb**

Many Laboratories were found to have good compliance with safety requirements

However, serious issues were found that needed to be dealt with and others may still exist throughout the Laboratory

## Chemical Storage and Safety Inspection Preliminary Report

### Two Primary Purposes of the Project

1. Conduct lab by lab safety inspection
2. Work with ESHC, ECR & WMR to abate hazards as they were found

Although not a primary purpose for the inspection, a CMS re-inventory was conducted to validate the CMS database. This and direct interaction with the PIs were some of the valuable side benefits resulting from the project.

# Chemical Storage and Safety Inspection Preliminary Report

## SUMMARY

- *Three staff members of the IH group led the study over this period, with a combined effort amounting to about 350 hours (and growing).*
- *More than 240 spaces were carefully inspected that included laboratories, service chases, basements, and stock rooms.*
- *Nearly 22,700 chemical containers were scanned and reported to CMS.*
  - *at least 200 were found to have no barcode (<1%)*
- *Approximately 700 pounds of legacy waste has been removed by this project;*
  - *approximately 250 pounds were hazardous, highly acute toxins, carcinogens, unstable or reactive.*

## Chemical Storage and Safety Inspection Preliminary Report

### Average Lab Inspection Times

On average, it took 2-3 hours to inspect and re-inventory a single lab.

The total time per room depends on the number of chemicals located in the room and can take up to 16 hours for a fully stocked storeroom.

These estimates include administrative time but not the initial training on CMS procedures and equipment for the S&H reps. It also does not include time for the PI, ESHC, ECR or WMR.

# Chemical Storage and Safety Inspection Preliminary Report

## IDENTIFIED STORAGE/HAZARD ISSUES

- **Inadequate segregation of incompatible chemicals**
- **Improper storage of flammables**
  - Stored outside flammable cabinets eg. on the floor, In cabinets, closets, or shelves located near or adjacent to exits
  - Flammables stored in ordinary refrigerators and not explosion proof refrigerators
  - Flammable and flammable/toxic chemicals stored together in same cabinet
- **Container integrity compromised**
  - Leaking containers, broken caps, loose caps, contaminated bottles
- **Poor container labeling**
  - Improper, damaged or missing chemical labels, bar codes
- **Expired or non-existent test records**
  - peroxide testing
- **Poor housekeeping**
- **Legacy chemicals**
  - Expired
  - Broken containers
  - Unlabeled carcinogens
  - Water reactive/flammable liquid not stored properly
  - Leaking bottle of hydrazine
  - Uncapped bottles
  - Un-barcoded containers
  - Water reactive and hazardous polymerization chemical (diketene) left in refrigerator for years and forgotten by the owner
  - Many bottles of peroxidizables not tested or overdue. Several failed testing. Some ten years old
  - Unneeded explosive chemicals found (dinitrophenol, dinitrophenylhydrazine).

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## CMS Reinventory Assessment

- Discrepancies between CMS and actual inventories showed that for **each department** there were fewer chemicals onsite than in CMS. The actual numbers found in the laboratories ranged from **6% to >30% less than CMS** reports depending on the department.
  - Deletion Issues?
- Number of bar-coded chemicals on a **lab by lab** basis was found to be highly variable ranging from **~(-99%) to a high of ~(+400%)** difference or more.
  - Room vs Suite/Area as Location?

Percentages are not very useful; depends on number of containers

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## Implementation Barriers Identified

- Non-specific or inadequate instructions given in the subject areas
- Lack of adequate explosion proof refrigerators.
- Lack of updates to CMS for transfers/deletions
- No ownership of lost/legacy chemicals
- No requirement for periodic review of chemical inventories
- Lack of full, in-depth review and guidance for ESRs
- CMS database system lacks real-time access to information and changes
- Reluctance of researchers to navigate through paperwork (written forms) or use of online system
- Chemicals not bar coded. May have been brought to BNL site by other means than BNL requisition system or special BNL credit cards for specific chemical purchases are not captured. Some just fell off and were not replaced
- Lack of funding for disposal of legacy chemicals

# **Chemical Storage and Safety Inspection Preliminary Report**

## **Project Recommendations**

- Conduct Chemical Storage Inspections periodically (focused not Tier 1)
- Create Chemical Storage Checklist
- Provide CMS Re-Inventory Schedule and acceptance criteria
- Review CMS staffing and procedures to ensure compliance
- Reorganize chemical location criteria
- Flammable storage procedure review – SME guidance
- Have available secondary storage containers for immediate use
- Dispose of broken, expired, unused or unneeded chemicals – need to identify
- Explore Options for Disposal Funding – legacy chemicals

# **Chemical Storage and Safety Inspection Preliminary Report**

## **Recommendations for additional S&H Studies**

- Conduct focused Inspections
- Formalize CMS rep position
- Wipe sample project for carcinogen usage – weighing ?
- Conduct inspection of storage and use of OSHA regulated chemicals
- Conduct CMS re-inventories on annual basis until confident
- Conduct perchlorate testing on all hoods as a baseline for renovations
- Evaluate storage compatibility systems that are consistent and easy to follow